Tri-Malleolar Fracture and Dislocation with Deltoid Rupture and Fibular Fracture
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Objective:
To present the case of a high school football player with a tri-malleolar fracture and dislocation with deltoid rupture and a compound fracture of the fibula.

Background:
The athlete is an 18-year-old male, 5’10” and weighs 155 pounds. He plays wide receiver and outfield for Howard High School in Macon Georgia. The athlete reports no previous history of any fractures or severe injuries. The injury was sustained in his first game of the season; the athlete was blocking on this play. His ankle was landed on, and subsequently tackled. During these motions his ankle sustained a distraction and rotatory force. He immediately presented with acute, traumatic pain, and an obvious deformity. After imaging and reduction, it was confirmed he suffered an ankle dislocation with a fractured fibula and a grade three rupture to the deltoid ligaments. Surgery was scheduled September 6, 2016.

Differential Diagnosis
With the immediate trauma to the ankle, deformity was obvious. Initially focus was on athlete care and providing the necessary treatment and transport. After the initial treatment, other concomitant injuries included tibial fracture (Potts Fracture), fibular fracture (Knockoff fracture), and grade three deltoid ligamentous damage. When faced with this injury, the athletic trainer and the sports medicine staff acted quickly and efficiently to limit further damage.

Treatment
Initial treatment was given by the athletic trainer and physician for the Howard team. They immediately stabilized the lower leg and the distal foot and tried to keep the athlete calm and collected. The physician tried to initially reduce the ankle on the sideline but due to guarding and severity of the dislocation the attempt was unsuccessful. The athlete was transported to the local hospital for initial imaging and reduction under anesthesia. They proceeded with scheduling surgery. He was placed in a splint in a non-weight bearing position under his surgery date. The surgical intervention that was used was an open reduction internal rotation (ORIF) technique to repair the syndesmosis, a metal plate and screws were used to repair the compound fracture of the fibula and the deltoid was re-sutured in the correct place. After the surgery he was placed in a cast and crutches for six weeks and given Norco and Promethazine HCL for pain management. Rehabilitation did not start until the cast was removed and he was given a walking boot and one crutch. Generally, rehabilitation protocols for ORIF surgery generally take 8 weeks to get back to full weight bearing, and 6 months for full return to play, or longer depending on the level of activity and the sport. The first week of his rehabilitation was dedicated to reducing the edema still present from surgery and to start working on his range of motion and strength. We used towel stretches to help release the muscles in his calf, Thera band work in all directions to start strengthening his ankle and the muscles working in all directions, joint mobilizations to help him regain his range of motion and loosen up any scar tissue and straight leg raises with the boot on to help with the quadriceps deficit from being non-weight bearing for six weeks. To work on his
gait, he was instructed with verbal cues to keep his gait as normal as possible. By the end of the first week he was walking without crutches. Week two protocol was the same as week one, but he was given verbal cues for walking correctly in a boot but remained walking with one crutch. By the start of week 3 we began using ultrasound, at parameters of 1.4 W/cm², 1.0 MHz, duty cycle on 100% for 6 minutes, followed by joint mobilization to soften scar tissue, relieve any pain, and reduce swelling. Along with the exercises from the previous weeks, we added stationary biking with the boot on. During his treatment in week three, we started slowly doing more exercises without the boot on as well as walking in the clinic and at home without the boot. We also took the heel wedge out of the boot and loosened the straps on top to give him more mobility. For week four the goal was to get him out of the boot. We continued the ultrasound treatment, but we added new mulligan joint mobilization, which involved the athlete doing lunges while the examiner places force on his ankle to further improve range of motion. We started proprioception with single leg balance and step ups on an Airdex pad. We also began to gait train without the boot on. He was released to full weight bearing out of the boot during the middle of week 4. He was back to full weight bearing 9 and a half weeks after surgery. Week five we changed the protocol to get his cardiovascular endurance back up and to improve the speed at which he walks. We introduced him to walking on the treadmill and listening to his steps to make sure the cadence is where it needs to be. We continued proprioception training with air squats and lunges on the Airdex, which also helped his quadriceps strength. BOSU ball step ups were also added this week along with walking RDL’s. His rehabilitation is ongoing yet successful. The final goal for rehab is to return to play in time for baseball season.

Uniqueness
An ankle dislocation is an extremely unique injury on its own due to the distraction and rotary force needed to dislocate the ankle. But in this case the athlete also had a compound butterfly fracture to the fibula with an accompanying grade three tear to the deltoid ligaments. The surgery itself was also unique. The surgeon first made a lateral incision to repair his fibula first, but once they got the incision open the fracture to the fibula was greater and more severe than they could see on the images. This caused the surgeon to increase the length of his incision. They had to re-align the fracture and remove any debris from the site. They placed a metal plate and screws to hold the fibula and give further stabilization for the rest of the procedure. After the fibula was stable, they inserted the TightRope surgical method to repair the syndesmosis and they checked their progress with images throughout the procedure. After the syndesmosis repair they made a medial incision to repair the torn deltoid ligament, re-attaching it. This was a very long procedure and the surgeon was faced with decisions that had to be made during the operation. It is also unique that the athlete is ambulatory nine weeks post surgery.

Conclusion
The athlete was diagnosed with a tri-malleolar fracture, with a fractured fibula, and deltoid rupture. The factors presented on the field led healthcare professionals to the diagnosis of an ankle dislocation and after further imaging it was concluded the fracture and ligament damage. The athlete had an open reduction internal fixation surgery to repair the damage. He was kept non weight bearing and then given a rehabilitation protocol to complete. His rehabilitation has been successful thus far but is still on going in hopes for return to baseball season. The surgeon is concerned about the early onset of osteoarthritis because of the trauma. There is also concern about the dissipation of forces. His fibula can no longer rotate the way it is supposed to so those
forces may be distributed to his knee or ankle later in life. The surgery and his recovery was successful but there are always possible complications to come later in life.

References

B. Huff, ATC, Fall 2016